Fig. 1

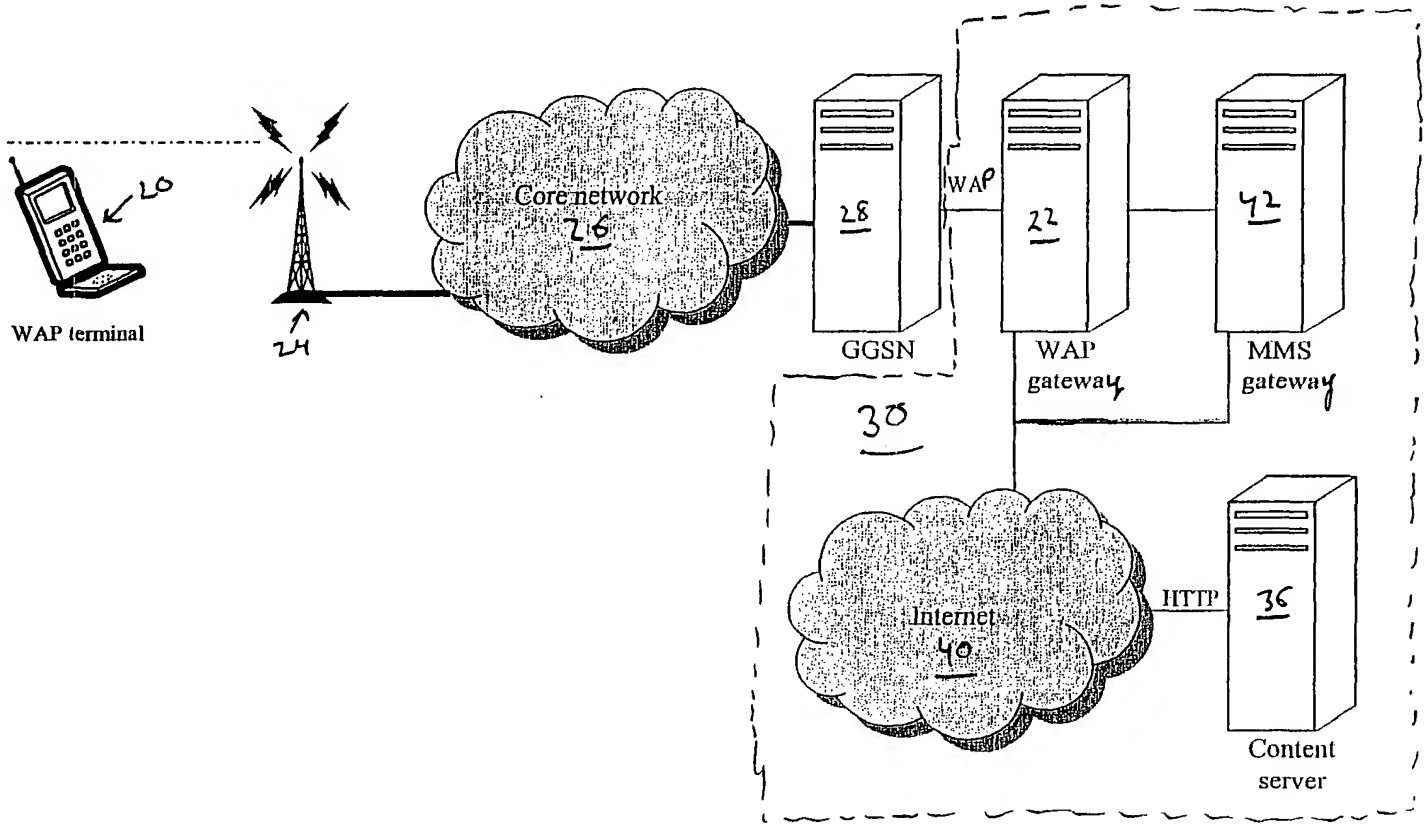
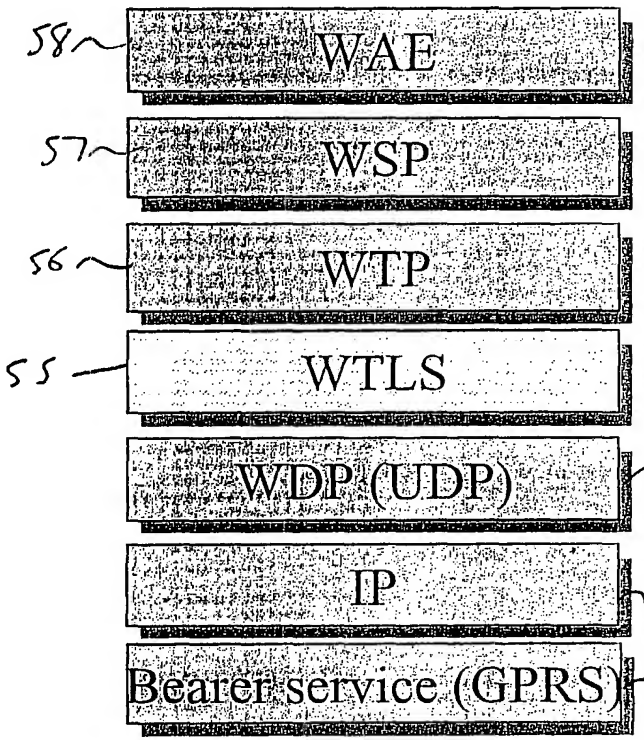

WAP terminal
20
24
Core network
26
28
WAP
22
42
GGSN
WAP
gateway
MMS
gateway
30
Internet
40
HTTP
36
Content
server

Fig. 2



WAP Application Environment.

WSP implements session control (similar to HTTP). Works in connection-based and connectionless modes.

WTP is a main transport layer, but it's not used in WSP connectionless mode.

WTLS layer is optional and still rarely used by modern WAP terminals.

UDP/IP is used as WDP over GPRS Network.

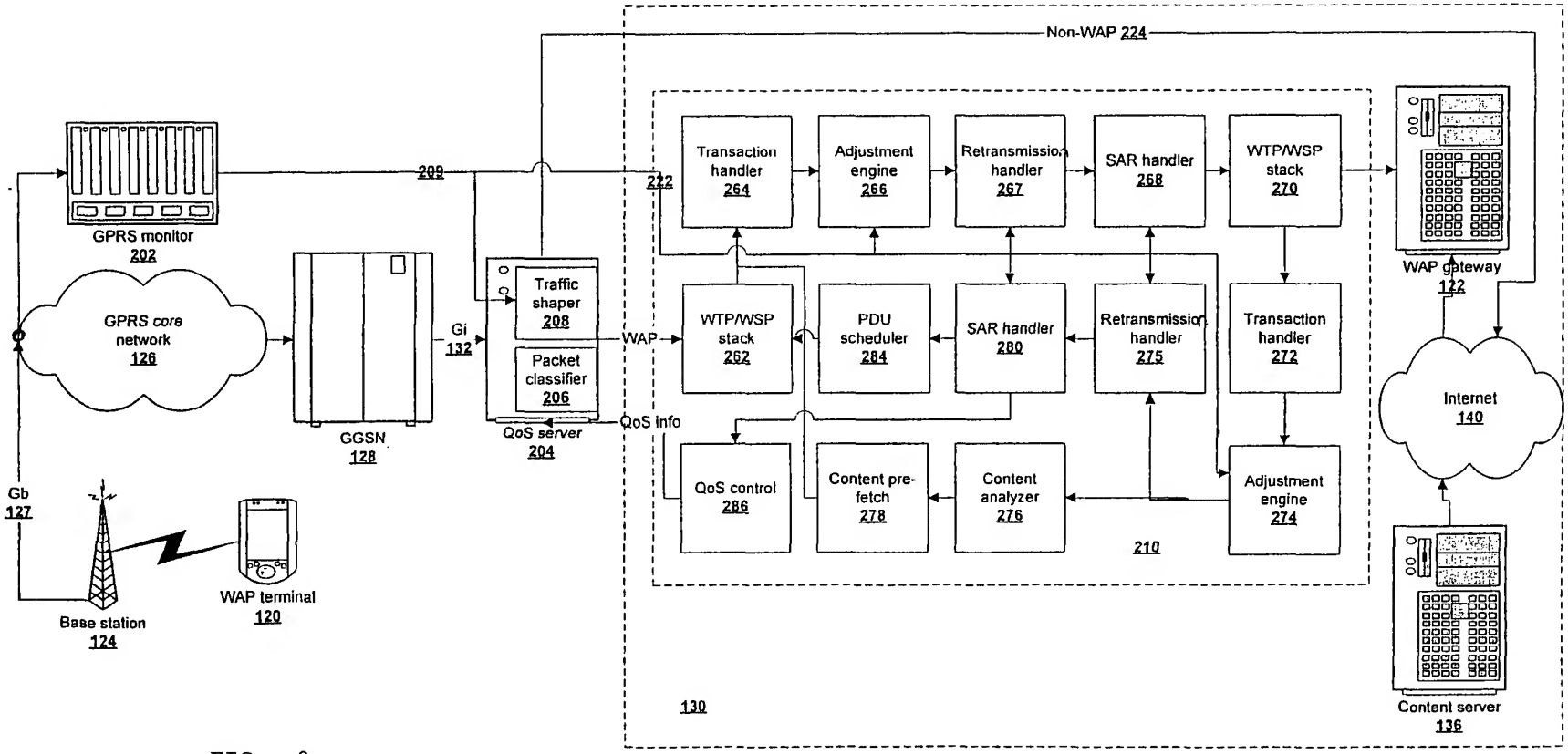

Non-WAP 224
GPRS monitor
202
209
222
Transaction handler 264
Adjustment engine 266
Retransmission handler 267
SAR handler 268
WTP/WSP stack 270
WAP gateway 122
GPRS core network 126
GGSN 128
Gi 132
Traffic shaper 208
Packet classifier 206
QoS server 204
WAP
QoS info
WTP/WSP stack 262
PDU scheduler 284
SAR handler 280
Retransmission handler 275
Transaction handler 272
Internet 140
QoS control 286
Content pre-fetch 278
Content analyzer 276
Adjustment engine 274
210
Gb 127
Base station 124
WAP terminal 120
130
Content server 136

FIG. 3

FIG. 4

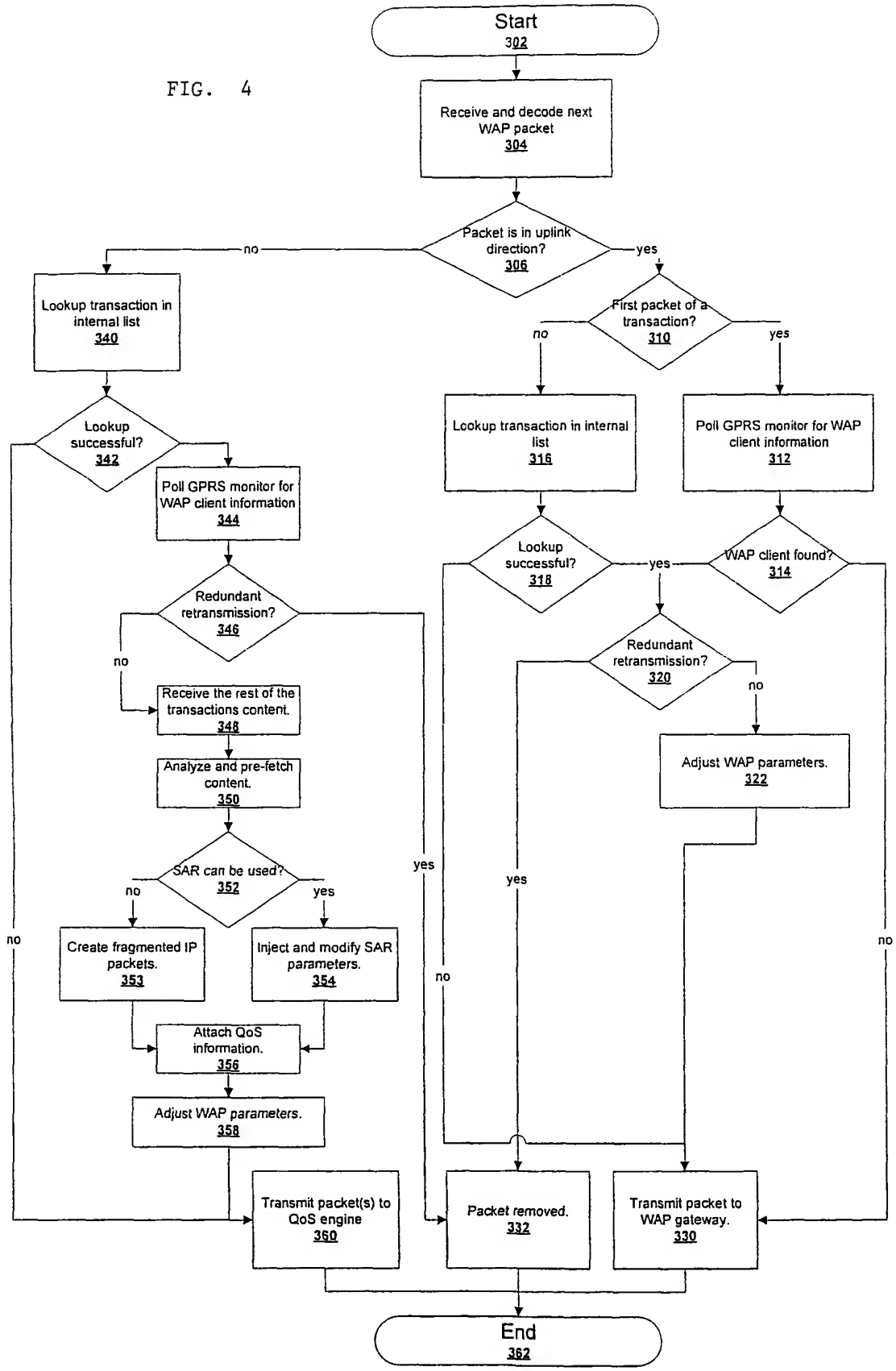

Start
302
Receive and decode next WAP packet
304
Packet is in uplink direction?
306
no
yes
Lookup transaction in internal list
340
First packet of a transaction?
310
no
yes
Lookup successful?
342
Lookup transaction in internal list
316
Poll GPRS monitor for WAP client information
312
Poll GPRS monitor for WAP client information
344
Lookup successful?
318
yes
WAP client found?
314
Redundant retransmission?
346
Redundant retransmission?
320
no
Receive the rest of the transactions content.
348
Adjust WAP parameters.
322
Analyze and pre-fetch content.
350
SAR can be used?
352
no
yes
Create fragmented IP packets.
353
Inject and modify SAR parameters.
354
Attach QoS information.
356
Adjust WAP parameters.
358
Transmit packet(s) to QoS engine
360
Packet removed.
332
Transmit packet to WAP gateway.
330
End
362

Fig. 5

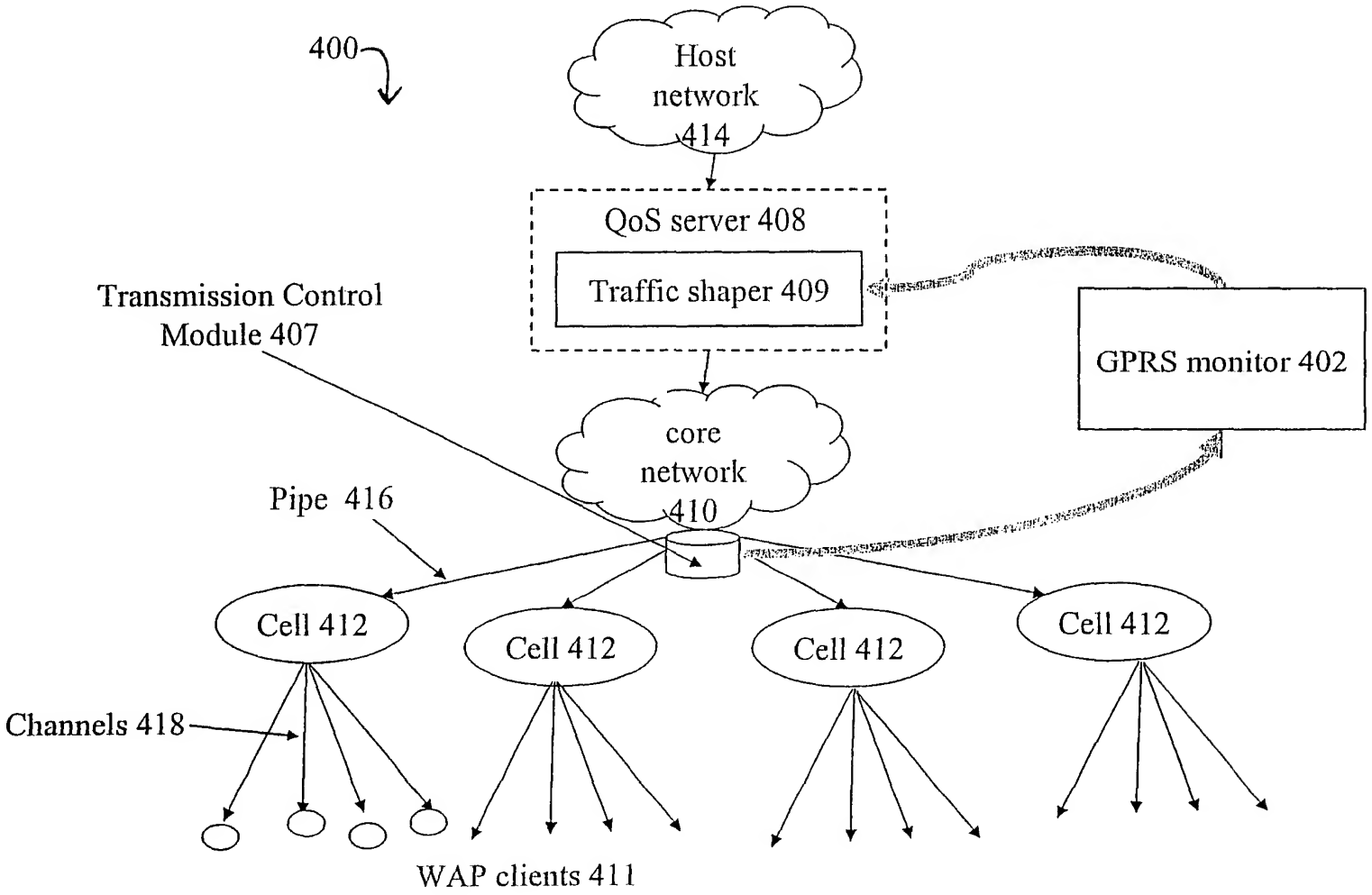
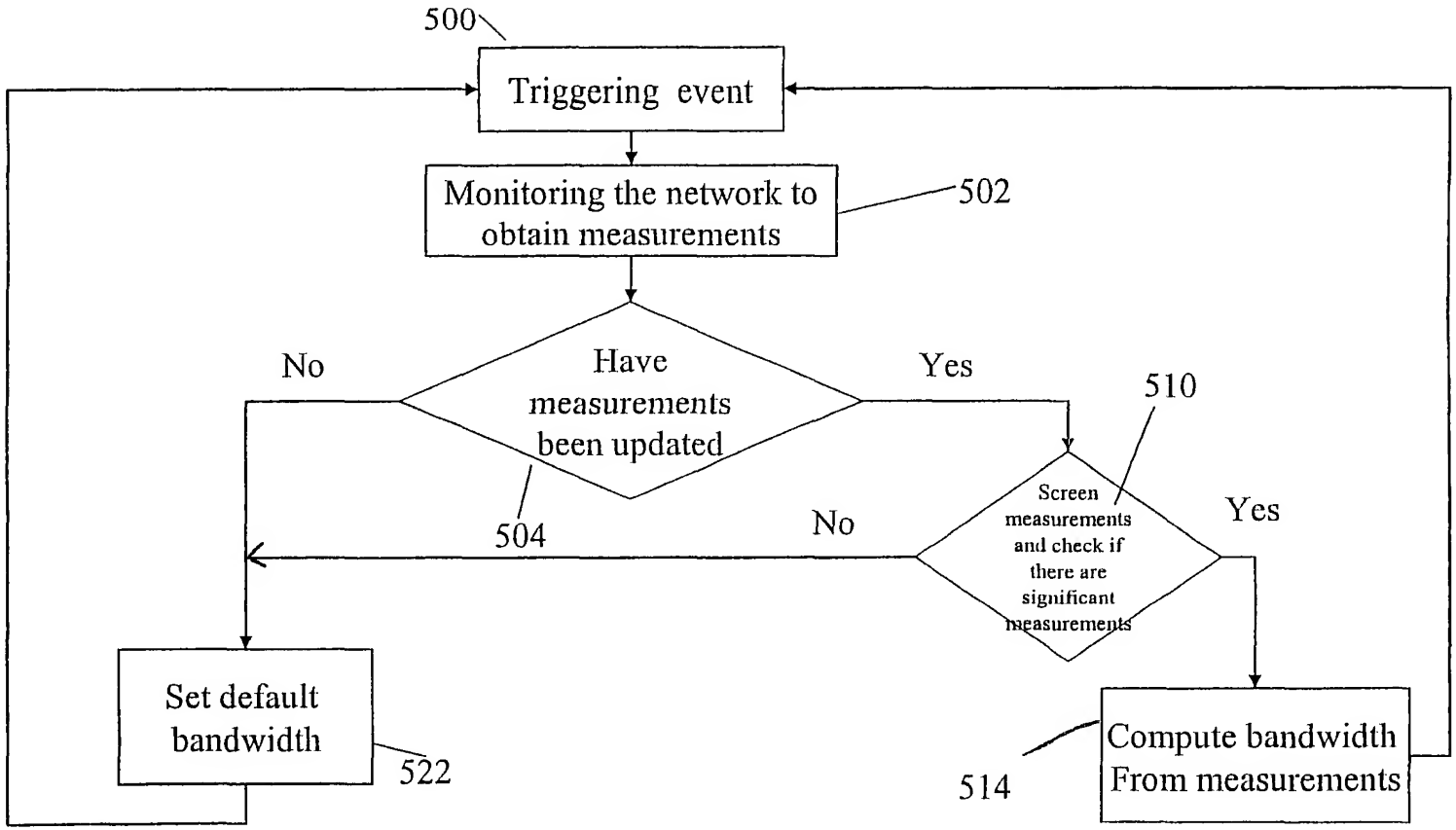

400
Host network 414
QoS server 408
Traffic shaper 409
Transmission Control Module 407
GPRS monitor 402
core network 410
Pipe 416
Cell 412
Cell 412
Cell 412
Cell 412
Channels 418
WAP clients 411

Fig. 6


500
Triggering event
Monitoring the network to obtain measurements
502
Have measurements been updated
No
Yes
504
510
Screen measurements and check if there are significant measurements
No
Yes
Set default bandwidth
522
Compute bandwidth From measurements
514